CLAIM AMENDMENTS

1. (original) A battery-optimized system-on-a-chip comprises:

multimedia module operably coupled to produce rendered output data;

high-speed interface;

processing module;

on-chip memory operably coupled to store at least a portion of a multimedia application, wherein the processing module processes input multimedia data in accordance with the at least the portion of the multimedia application to produce output multimedia data, wherein the input multimedia data is received from at least one of the multimedia module and the high-speed interface, and wherein the output multimedia data is provided to at least one of the multimedia module and the high-sped interface; and

on-chip DC-to-DC converter operably coupled to convert a battery voltage into a supply voltage, wherein the DC-to-DC converter provides the supply voltage to at least one of the multimedia module, the high-speed interface, the processing module, and the on-chip memory.

2. (original) The battery-optimized system-on-a-chip of claim 1, wherein the on-chip memory is further operably coupled to provide at least a portion of the input

multimedia data and is further operably coupled to receive at least a portion of the output multimedia data.

3. (original) The battery-optimized system-on-a-chip of claim 1 further comprises:

a memory interface operably coupled to provide at least a portion of the output multimedia data to external memory and to receive at least a portion of the input multimedia data from the external memory.

4. (original) The battery-optimized system-on-a-chip of claim 3 further comprises a plurality of memory interfaces operably coupled to provide a plurality of output multimedia data to a plurality of external memories and to receive a plurality of input multimedia data from the plurality of external memories, wherein the plurality of memory interfaces include the memory interface, wherein the plurality of external memories includes the external memory, the plurality of output multimedia data includes the at least a portion of the output multimedia data, and the plurality of input multimedia data includes the at least a portion of the input multimedia data.

5. (original) The battery-optimized system-on-a-chip of claim 1 further comprises a plurality of processing modules operably coupled to perform a plurality of multimedia applications, wherein the plurality of processing modules includes the processing module.

6. (original) The battery-optimized system-on-a-chip of claim 1 further comprises a plurality of high speed

interfaces operably coupled to provide a plurality of input multimedia data to the processing module from a plurality of external sources and to provide a plurality of output multimedia data to the plurality of external sources, wherein the plurality of high-speed interfaces includes the high-speed interface, the plurality of input multimedia data includes the input multimedia data, and the plurality of output multimedia data includes the output multimedia data.

7. (original) The battery-optimized system-on-a-chip of claim 6, wherein each of the plurality of external sources comprises at least one of: a host computer, a video decoder, memory card, removable memory drive, a wireless modem, and a CMOS/CCD image sensor.

8. (original) The battery-optimized system-on-a-chip of claim 1, wherein each of the input and output multimedia data further comprises at least one of: digital audio, analog audio, digital video, analog video, text, and video graphics.

9. (original) The battery-optimized system-on-a-chip of claim 1 further comprises a battery charger operably coupled to charge a battery that provides the battery voltage when an external power source is coupled to the battery-optimized system-on-a-chip.

10. (original) The battery-optimized system-on-a-chip of claim 1, wherein the high-speed interface further comprises a universal serial bus compliant interface.

11. (original) The battery-optimized system-on-a-chip of claim 1, wherein the multimedia module produce the rendered output data from the output multimedia data, the multimedia module further comprises:

a capacitor-less headphone driver operably coupled to provide at least a portion of the rendered output data to a pair of headphones, wherein the capacitor-less headphone driver includes:

a first channel driver;

a second channel driver; and

an AC ground channel driver, wherein the first channel driver drives a first channel of the pair of headphones with a return via the AC ground channel driver and wherein the second channel driver drives a second channel of the pair of headphones with a return via the AC ground channel driver.

12. (original) The battery-optimized system-on-a-chip of claim 11, wherein the capacitor-less headphone driver further comprises:

a first channel integrated circuit (IC) pad operably coupled to the first channel driver;

a second channel IC pad operably coupled to the second channel driver;

an AC ground IC pad operably coupled to the AC ground channel driver; and

a unit gain feedback IC pad operably coupled to provide a unity gain feedback for the AC ground channel driver.

13. (original) The battery-optimized system-on-a-chip of claim 1 further comprises:

an electro-luminance backlighting drive circuitry operably coupled to at least partially power a backlight to a display that is displaying at least a portion of the output multimedia data to, wherein the electro-luminance backlighting drive circuitry includes:

a sink transistor connection;

a first load transistor connection;

a second load transistor connection;

gating circuitry operably coupled to enable a sink transistor operably coupled to the sink transistor connection to sink energy from an external inductor and to enable one of first and second load transistors operably coupled to the first and second load transistor connections to draw energy from a second external inductor to provide an electro-luminance backlighting drive voltage.

14. (original) The battery-optimized system-on-a-chip of claim 1, wherein the DC-to-DC converter is further coupled to provide the supply voltage off-chip.

15. (original) The battery-optimized system-on-a-chip of claim 1, wherein the on-chip memory further comprises at least one of flash memory, read only memory, and random access memory.

16. (original) The battery-optimized system-on-a-chip of claim 1, wherein the multimedia module further functions to provide the rendered output data to at least one of: headphones, a speaker, and a video graphics display, and wherein the multimedia module further functions to receive input signals from at least one of: a keypad, a keyboard, an image capture device, and a microphone, wherein the multimedia module processes the input signals to produce the input multimedia data.

17. (original) A comprehensive system-on-a-chip comprises:

a processing core operably coupled to process input digital data and produce therefrom output digital data;

digital interface circuitry operably coupled to provide the input digital data to the processing core and to receive the output digital data from the processing core;

mixed signal circuitry operably coupled to convert input analog signals into at least some of the input digital data and to convert at least some of the output digital data into output analog signals; and

battery optimization circuitry that includes a DC-to-DC converter and a battery charger, wherein the DC-to-DC converter is operably coupled to convert a battery voltage into a supply voltage that supplies at least one of: the processing core, the digital interface circuitry, and the mixed signal circuitry and the battery charger is operably coupled to charge a battery that generates the battery voltage.

18. (original) The comprehensive system-on-a-chip of claim 17, wherein the processing core further comprises: at least one processing module and on-chip memory, wherein the on-chip memory is operably coupled to store at least a portion of a multimedia application, wherein the at least one processing module processes the input digital data in accordance with the at least the portion of the multimedia application to produce the output digital data.

19. (original) The comprehensive system-on-a-chip of claim 18, wherein the on-chip memory is further operably coupled to provide at least a portion of the input digital data and is further operably coupled to receive at least a portion of the output digital data.

20. (original) The comprehensive system-on-a-chip of claim 17, wherein mixed signal circuitry further comprises:

a memory interface operably coupled to provide at least a portion of the output digital data to external memory and to receive at least a portion of the input digital data from the external memory.

21. (original) The comprehensive system-on-a-chip of claim 20 further comprises a plurality of memory interfaces operably coupled to provide a plurality of output digital data to a plurality of external memories and to receive a plurality of input digital data from the plurality of external memories, wherein the plurality of memory interfaces include the memory interface, wherein the plurality of external memories includes the external memory, the plurality of output digital data includes the at least a portion of the output digital data, and the plurality of input digital data includes the at least a portion of the input digital data.

22. (original) The comprehensive system-on-a-chip of claim 17 further comprises a plurality of high speed interfaces operably coupled to provide a plurality of input digital data to the processing module from a plurality of external sources and to provide a plurality of output digital data

to the plurality of external sources, wherein the plurality of input digital data includes the input digital data and the plurality of output digital data includes the output digital data.

23. (original) The comprehensive system-on-a-chip of claim 22, wherein each of the plurality of external sources comprises at least one of: a host computer, a video decoder, memory card, removable memory drive, a wireless modem, and a CMOS/CCD image sensor.

24. (original) The comprehensive system-on-a-chip of claim 17, wherein each of the input and output digital data further comprises at least one of: digital audio, analog audio, digital video, analog video, text, and video graphics.

25. (original) The comprehensive system-on-a-chip of claim 17, wherein the mixed signal circuitry further comprises:

a capacitor-less headphone driver operably coupled to provide at least a portion of the output multimedia data to a pair of headphones, wherein the capacitor-less headphone driver includes:

a first channel driver;

a second channel driver; and

an AC ground channel driver, wherein the first channel driver drives a first channel of the pair of headphones with a return via the AC ground channel

driver and wherein the second channel driver drives a second channel of the pair of headphones with a return via the AC ground channel driver.

26. (original) The comprehensive system-on-a-chip of claim 25, wherein the capacitor-less headphone driver further comprises:

a first channel integrated circuit (IC) pad operably coupled to the first channel driver;

a second channel IC pad operably coupled to the second channel driver;

an AC ground IC pad operably coupled to the AC ground channel driver; and

a unit gain feedback IC pad operably coupled to provide a unity gain feedback for the AC ground channel driver.

27. (original) The comprehensive system-on-a-chip of claim 17, wherein the mixed signal circuitry further comprises:

an electro-luminance backlighting drive circuitry operably coupled to at least partially power a backlight to a display that is displaying at least a portion of the output multimedia data to, wherein the electro-luminance backlighting drive circuitry includes:

a sink transistor connection;

a first load transistor connection;

a second load transistor connection;

gating circuitry operably coupled to enable a sink transistor operably coupled to the sink transistor connection to sink energy from an external inductor and to enable one of first and second load transistors operably coupled to the first and second load transistor connections to draw energy from a second external inductor to provide an electro-luminance backlighting drive voltage.

28. (original) The comprehensive system-on-a-chip of claim 17, wherein the DC-to-DC converter is further coupled to provide the supply voltage off-chip.

29. (original) A multiple function battery operated device comprises:

an inductor;

a battery;

a display interface; and

a battery-optimized system-on-a-chip operably coupled to the inductor, the battery, and the display interface, wherein the battery-optimized system-on-a-chip includes:

multimedia module operably coupled to the display interface, wherein the multimedia module generates rendered output data;

high-speed interface;

processing module;

on-chip memory operably coupled to store at least a portion of a multimedia application, wherein the processing module processes input multimedia data in accordance with the at least the portion of the multimedia application to produce output multimedia data, wherein the input multimedia data is received from at least one of the multimedia module and the high-speed interface, and wherein the output multimedia data is provided to at least one of the multimedia module and the high-sped interface; and

on-chip DC-to-DC converter operably coupled to convert a battery voltage provided by the battery in conjunction with the inductor into a supply voltage, wherein the DC-to-DC converter provides the supply voltage to at least one of the multimedia module, the high-speed interface, the processing module, and the on-chip module.

30. (original) The multiple function battery operated device of claim 29, wherein the on-chip memory is further operably coupled to provide at least a portion of the input multimedia data and is further operably coupled to receive at least a portion of the output multimedia data.

31. (original) The multiple function battery operated device of claim 29 further comprises:

a memory interface operably coupled to provide at least a portion of the output multimedia data to external memory and to receive at least a portion of the input multimedia data from the external memory.

32. (original) The multiple function battery operated device of claim 31 further comprises a plurality of memory interfaces operably coupled to provide a plurality of output multimedia data to a plurality of external memories and to receive a plurality of input multimedia data from the plurality of external memories, wherein the plurality of memory interfaces include the memory interface, wherein the plurality of external memories includes the external memory, the plurality of output multimedia data includes the at least a portion of the output multimedia data, and

the plurality of input multimedia data includes the at least a portion of the input multimedia data.

33. (original) The multiple function battery operated device of claim 29 further comprises a plurality of processing modules operably coupled to perform a plurality of multimedia applications, wherein the plurality of processing modules includes the processing module.

34. (original) The multiple function battery operated device of claim 29 further comprises a plurality of high speed interfaces operably coupled to provide a plurality of input multimedia data to the processing module from a plurality of external sources and to provide a plurality of output multimedia data to the plurality of external sources, wherein the plurality of high-speed interfaces includes the high-speed interface, the plurality of input multimedia data includes the input multimedia data, and the plurality of output multimedia data includes the output multimedia data.

35. (original) The multiple function battery operated device of claim 34, wherein each of the plurality of external sources comprises at least one of: a host computer, a video decoder, memory card, removable memory drive, a wireless modem, and a CMOS/CCD image sensor.

36. (original) The multiple function battery operated device of claim 29, wherein each of the input and output multimedia data further comprises at least one of: digital audio, analog audio, digital video, analog video, text, and video graphics.

37. (original) The multiple function battery operated device of claim 29 further comprises a battery charger operably coupled to charge a battery that provides the battery voltage when an external power source is coupled to the battery-optimized system-on-a-chip.

38. (original) The multiple function battery operated device of claim 29, wherein the high-speed interface further comprises a universal serial bus compliant interface.

39. (original) The multiple function battery operated device of claim 29, wherein the multimedia module produce the rendered output data from the output multimedia data, the multimedia module further comprises:

a capacitor-less headphone driver operably coupled to provide at least a portion of the rendered output data to a pair of headphones, wherein the capacitor-less headphone driver includes:

a first channel driver;

a second channel driver; and

an AC ground channel driver, wherein the first channel driver drives a first channel of the pair of headphones with a return via the AC ground channel driver and wherein the second channel driver drives a second channel of the pair of headphones with a return via the AC ground channel driver.

40. (original) The multiple function battery operated device of claim 39, wherein the capacitor-less headphone driver further comprises:

a first channel integrated circuit (IC) pad operably coupled to the first channel driver;

a second channel IC pad operably coupled to the second channel driver;

an AC ground IC pad operably coupled to the AC ground channel driver; and

a unit gain feedback IC pad operably coupled to provide a unity gain feedback for the AC ground channel driver.

41. (original) The multiple function battery operated device of claim 29 further comprises:

an electro-luminance backlighting drive circuitry operably coupled to at least partially power a backlight to a display that is displaying at least a portion of the output multimedia data to, wherein the electro-luminance backlighting drive circuitry includes:

a sink transistor connection;

a first load transistor connection;

a second load transistor connection;

gating circuitry operably coupled to enable a sink transistor operably coupled to the sink transistor connection to sink energy from an external inductor and to enable one of first and second load transistors operably coupled to the first and second load transistor connections to draw energy from a second external inductor to provide an electro-luminance backlighting drive voltage.

42. (original) The multiple function battery operated device of claim 29, wherein the DC-to-DC converter is further coupled to provide the supply voltage off-chip.

43. (original) The multiple function battery operated device of claim 29, wherein the on-chip memory further comprises read only memory and random access memory.

44. (original) The multiple function battery operated device of claim 29, wherein the multimedia module further functions to provide the rendered output data to at least one of: headphones, a speaker, and a video graphics display, and wherein the multimedia module further functions to receive input signals from at least one of: a keypad, a keyboard, an image capture device, and a microphone, wherein the multimedia module processes the input signals to produce the input multimedia data.

45. (original) The multiple function battery operated device of claim 29, wherein the display further comprises at least one of: a headphone jack, a speaker, and a video graphics display.

46. (original) The multiple function battery operated device of claim 29 further comprises an input device operably coupled to the multimedia module, wherein the input device includes at least one of: a microphone, a keypad, a keyboard, and an image capture device.